

THE IMPLEMENTATION OF PROJECT-BASED LEARNING MINI-RESEARCH TASKS ON STUDENTS' LEARNING OUTCOMES DURING THE PANDEMIC

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ABSTRACT

Statistics for Research Education is an important course for students in the Faculty of Education. Serious problems are experienced by students learning statistics, one of them is because the learning outcomes are not optimal. To overcome this problem, a lecturer can provide mini-research tasks. Mini-research is one form of assignment from project-based learning. This research was descriptive qualitative research. The subjects in this study were students from Cohort 2019 who took Educational Research Statistics courses. Learning activities and mini-research assignments are handled fully online. By giving students a mini-research assignment, students can be encouraged to learn statistical theories and concepts. Through mini-research tasks, students can increasingly see the big picture and interrelationships between topics in this course. The positive responses can be seen from students' reflections and results of the review given to the paper. The use of project-based learning with a mini-research task is an interesting idea and suitable for students. In addition to better student learning outcomes, students also become more conscious of the problems around them. Prospective teachers can learn to make research an upcoming provision when they enter the field of teaching.

Keywords: learning outcome, mini-research, pandemic era, project-based learning

INTRODUCTION

Educational Research Statistics is one of the subjects given to Pelita Harapan University Teacher College students. This course invites students to see the principle of God's truth in educational research. The content in this course is related to statistical theories and their applications in research, including understanding various statistical terminology, types of data, types of data distribution, data processing, data analysis, hypothesis testing, drawing conclusions, and interpretation of data. According to (Arnold, 2013), statistics explore the use of patterns and relationships in data. These two disciplines are related, but they use different ways of thinking and solving problems. Statistics is a way of thinking about data and working with them to answer substantive questions (Fienberg, 2014). Statistics is a branch of mathematics that has many benefits, including for prospective teachers. A teacher needs to have statistical skills to process data and present data. In addition, a future teacher should develop their abilities through research activity. Research conducted by teachers is expected to help teachers improve their learning quality. Statistics is a complex subject to learn. In statistics, some theories can be put into practice in conducting research. Educational research

statistics, which are taught at Universitas Pelita Harapan Teachers College, equip students to conduct special research in an education field. Thus, students are expected not only to understand theoretically but also to be able to practice the knowledge gained in conducting research.

Based on previous teaching experience, there were students' conceptual errors when working on several educational research statistical questions (Dirgantoro et al., 2019). If given a different question from the example, students feel confused and do not know what to do in working on the problem. Students do not understand the systematic steps in research. It can be seen from the results of the students' mid-semester exams, which showed an unsatisfactory score with an average score of 69.44. A solution that can be used to overcome the problems above is the Project-Based Learning model. Project-Based Learning is a creative, innovative, and contextual learning model which gives students the freedom to design and create a project from learning materials (Nugroho et al., 2019). The advantage of the Project-Based Learning model is that it can provide opportunities for students to build knowledge and develop their skills (Anggreni et al., 2019), besides that, students' critical thinking skills can also be improved (Astri et al., 2022). Project-Based Learning has many types of assignments. An assignment that can be given is mini research. The mini-research project is designed to be a form of simple research project-based learning in which students contribute dominantly, starting from research design, research implementation, and reporting research results in a scientific presentation (Haryono & Adam, 2021). Through this mini-research, students can learn to do research and write good scientific papers.

The problem of learning outcomes is significant because this will affect the students' achievement index. For this reason, students need to actively participate in learning, especially in online learning. Project-Based Learning is suitable as an alternative to online learning, because in the first semester of the 2021/2022 academic year at UPH Teachers College, online learning is still applied due to the Covid-19 Pandemic. Thus, it was found that there was a harmony in using Project-Based Learning to address student learning outcomes in the context of online learning during the pandemic. The expectation of the use of Project-Based Learning model is student learning outcomes will be better. It is easier for students to acknowledge the concepts in Educational Research Statistics courses and to practice the knowledge gained in conducting research. Therefore, the purpose of this research is to describe the implementation of Mini-Research Project-Based Learning on student learning outcomes during the pandemic.

LITERATURE REVIEW

Project-Based Learning

Project-Based Learning (PjBL) is a learning method that involves students constructing their knowledge through project completion or product development (Guo et al., 2020). Through this process, students are trained to find the solutions to authentic problems given through a process of knowledge integration, application, and construction (Guo et al., 2020). In its application, PjBL will require time, as well as the interaction between fellow students, as well as between students and teachers (Asan, 2005; Koparan & Guven, 2014). It means

that the learning process using PjBL can provide space for students to learn independently, strengthen conceptual understanding, and provide space for students to collaborate with fellow students. Through PjBL, students will collaborate in groups, and develop skills in planning, organizing, negotiating, and making consensus on task issues that are collected and presented scientifically (Noviyana, 2017).

Minister of Education and Culture, Nadiem Makarim suggested teachers try Project-based Learning during the Covid-19 pandemic (GTK, 2020). The Minister of Education and Culture believes that with Project-based Learning, the principle of cooperation will manifest in teaching and learning activities. By implementing PjBL, students are trained to be responsible, challenged, collaborate, learn to work together, and grow the ability to encourage (motivate) others. The characteristics of PjBL include: 1) task completion is carried out independently, starting from the planning, and preparation, to product presentation stages; 2) students are fully responsible for the project to be produced; 3) the project involves the roles of peers, teachers, parents, and even the community; 4) train creative thinking skills; and 5) the classroom situation is very tolerant of the lack and development of ideas (GTK, 2020).

The results of previous studies show that PjBL can help students in learning. Research (Koparan & Guven, 2014) explains that PjBL increased students' attitudes towards statistics in the intervention group. The implementation of PjBL during the pandemic has also been proven to be able to help students to be active and innovative, increase student motivation, increase student and parent collaboration (Sukmana & Amalia, 2021), and improve student learning outcomes (Fahadah et al., 2021; Misidawati et al. al., 2022).

Mini Research

Mini research is a form of giving assignments in learning. Mini research is identical to free inquiry (Permari, 2016), which encourages students to identify problems and then find solutions to these problems through experiments. The Ministry of Education and Culture (Wardani & Kurnia, 2019) stated that through mini-research, students are facilitated to independently design projects to be implemented so that students can explore, assess, interpret, synthesize, and provide information. Students can directly carry out research but with a narrower context. Before carrying out the mini-research, students are given stages as a guide. The stages of implementing mini-research (Kusumawardana & Dintarini, 2021) include: 1) determining the research theme, 2) determining research hypotheses, 3) distributing online questionnaires, 4) processing data using SPSS software, 5) processing data and interpreting research results, and 6) report generation. In this study, the stages of implementing mini research consist of 1) determining research topics related to education, 2) designing research flows, 3) compiling research instruments, 4) collecting research data, 5) processing research data, and 6) interpreting research results, 7) make a report, and 8) present the results of the mini research.

Mini research activities can help students improve their competence. The results of previous research stated that mini research activities can improve science process skills (Permari, 2016), increase the ability to master conservation biology material (S. Leksono,

2016), improve student learning outcomes, change attitudes, skills, values, behavior, and beliefs towards nature (Daulae et al., 2018), and has a positive effect on the ability to analyze problems (S. M. Leksono et al., 2020). Meanwhile, other research results state that the implementation of mini research in statistics courses can have a positive impact on students' mathematical interpretation abilities (Kusumawardana & Dintarini, 2021).

Students' Learning Outcome in Pandemic Era

In the pandemic era, learning activities were very limited. The learning environment must change. Students who initially study in schools where environmental conditions have been made in such a way as to support learning activities, now have to be carried out from their respective homes. The learning environment is indicated to have a considerable impact on student learning outcomes (Nurastanti et al., 2019). This means that the student's learning environment at home also needs to be adjusted to support student in learning. But in reality, not all families can provide this for students. Many students' have unsupported environment to carry out learning activities. In addition to environmental conditions, other factors that also influence learning activities, especially online learning are supporting facilities or infrastructures such as the availability of electricity, internet networks, and supporting devices. In Indonesia, the internet network is not evenly distributed throughout the region. The difficulty in accessing the internet and unsupported devices make it difficult for students to access online learning.

These factors can affect student achievement in learning become not optimal. This happens not only at the elementary school level (Kurniasari, Pribowo, & Putra, 2020), secondary school (Mauliddiyah & Wulandari, 2022; Pratomo & Gumantan, 2021), but also in higher education. To overcome this, there are many ways that teachers have tried to improve student learning outcomes during this pandemic, including through learning methods (Elkhatat & Al-Muhtaseb, 2021; Özhan & Kocadere, 2020), learning media (Octaberlina & Muslimin, 2020; Wichadee, 2017), as well as giving interesting assignments (Wajong et al., 2020). During the pandemic, students experienced learning loss. Students feel bored if learning is done online. Therefore, students need project-based learning. Giving projects to students can make them more enthusiastic about participating in class. Student scores during online learning can be said to be quite good, but not optimal because of several inhibiting factors. Students are disturbed by environmental conditions, so they don't concentrate when learning.

RESEARCH METHODOLOGY

The method used in this study is a descriptive qualitative method and supported by quantitative data to show student's learning outcomes after the teacher applies the Project-Based Learning model. The data used for this research is data on student learning outcomes in working on mini research projects. The sample used was the 2019 Teachers College UPH students who took Educational Research Statistics courses in the odd semester, namely Indonesian Language Education, Social Sciences Education, Economics Education and Christian Religious Education study programs with 96 students. Students are divided into 22

groups. Each group consists of 4-6 students. In groups, students as respondents in this study will work on the assignment by making mini research, which is collected in paper form, then the paper will be presented. Since the learning process is finished online, the presentation is recorded and uploaded on YouTube. Next, students listen to each other's presentation videos and then ask to give a review of their friends who are presenting, followed by filling in peer assessments and giving suggestions for the improvement of their papers. The problems raised in the mini research are problems that are selected based on the results of discussions in groups, according to the interests of students in research. The problems raised are topics related to daily life and exist around students. Each group is expected to raise a different problem so that the results obtained are varied and complementary.

The objectives of qualitative research include: (1) describing objects; it needs to be described through photographing, video, illustrating, and narrating. This depiction can be done on objects in the form of events, social interactions, religious social activities, and so on. (2) exploring the meaning behind the phenomena; the meaning behind the phenomenon/fact can be revealed if the researcher shows and reveals it through deep interviews and participant observation. (3) explaining objects; phenomena that appear in the field are sometimes not the same as what is the goal, become the core of the problem or in other words appear different from the main purpose, so that a detailed, detailed, and systematic explanation is needed (Setiawan & Anggito, 2018). This qualitative research is certainly different from quantitative research, because qualitative research does not use statistics but through data collection, analysis, and then interpretation (Fadli, 2021).

RESULTS AND DISCUSSION

Mini research projects are given to students in groups at the first meeting, when the lecturers and students discuss the RPS (Semester Learning Plan). It helps students to understand and prepare for working on this project. Students are given chance to choose the research topic or theme they want. It will help develop students' awareness to changes or problems that occur around them, especially during the pandemic they are currently facing. After students agree on the research theme, students need to consult with the lecturer. Figure 1 shows an overview of the process of making mini research that needs to be done by students in groups.

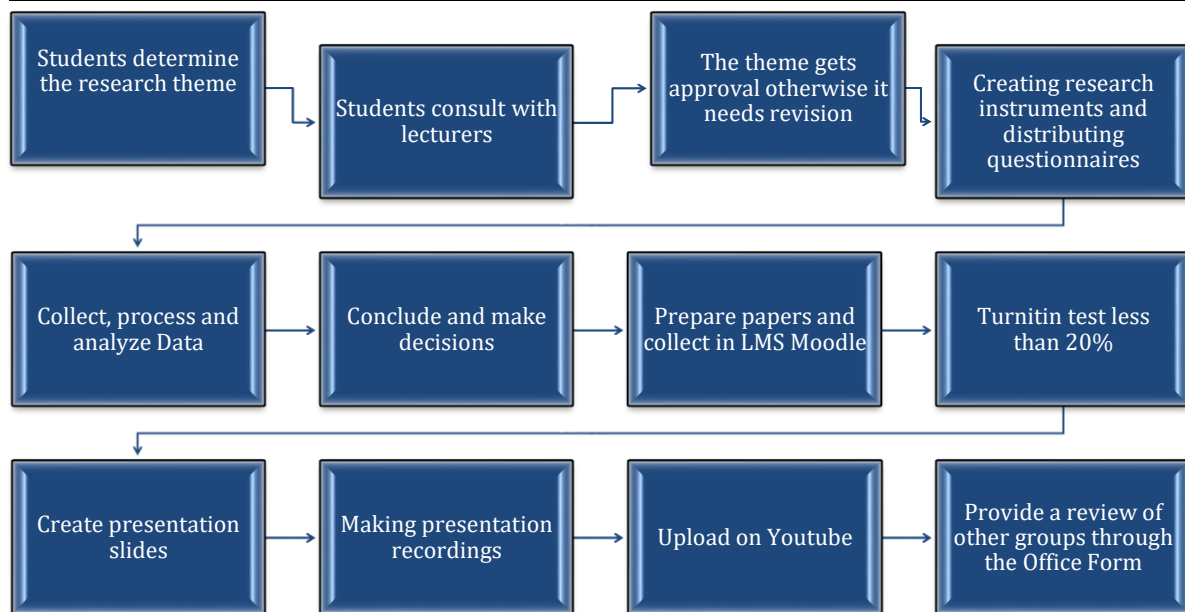


Figure 1. The learning process with Project Mini Research

After students choose a topic and determine a research title, then students collect theories related to the research title. Students begin to develop the background and supporting theory and determine the statistical hypothesis tests needed in their research. Next, students develop appropriate research instruments, collect data, process data, analyze data, make conclusions, and make decisions. It helps students in connecting concepts and theories that have been studied during one semester. The results of the mini research project are reported in the form of a paper and presented. The template or paper format has been provided by the lecturer and circulated before the division of mini research tasks. The presentation of the mini research project is done by recording the group presentation, then uploading it to YouTube. The submission of mini research papers and video presentations was carried out before meeting 16. After all groups have submitted their assignments, each student listened to the presentation videos from other groups. The purpose is for students to learn from each other and share information. Then students review, fill in peer assessments, and give suggestions for the presenting group. At the end of the activity, students also write reflections on the work on the mini research project.

Table 1. Descriptive Statistics of Mini Research Value

Description	Values
Mean	86.94
Minimum	68.17
Maximum	95.64
Standart Deviation	7.76

From Table 1 the performance of students in completing mini research projects is good. The average score of students in preparing projects is 86.94 where this average shows a better score than the average score for the midterm exam. The minimum score obtained by students is 68.17 and the maximum score obtained is 95.64. In addition, the standard deviation obtained is 7.76 which understands the spread of the data is still quite good or the resulting value is quite varied. From the data obtained, students understand the research flow well enough so that they can work on mini research projects as expected in the rubric. Students can clearly describe the background and problem formulation as well as describe all research variables with a minimum of 3 reference sources. In addition, students also explain the sampling technique, population, and samples used in the study. In this project, students are required to use a minimum of 30 research samples in total. After determining the number of samples, students also explain the scale of the research data and present it in the form of tables, bar charts/histograms.

Next, students present all descriptive statistical data containing the mean or mean, median, mode, standard deviation, and other related matters. Students also need to make a hypothesis test that includes prerequisite hypothesis testing and statistical hypothesis testing. Furthermore, students also describe all assumptions or prerequisite tests that must be met. Students must clearly and correctly explain all steps and statistical analysis. Furthermore, students draw correct conclusions. Students also need to provide suggestions for improving overall research deficiencies. All bibliographies must be written using APA rules, Edition 6. After that, students attach the results of Turnitin checks with a similarity of less than or equal to 20%. Students also need to attach all statistical calculations and questionnaires used, both prerequisite tests and inferential statistical tests. And the last is a presentation with a duration of 10 minutes in the form of a recording.

After students complete their mini-research and listen to presentation videos from other groups, students reflect independently. From the overall results of these reflections, there are 7 aspects of insight obtained by students.

Table 2. Student Reflection Results After Learning

Aspects	Insight from Students
1. The nature of research	Students see the importance of doing research systematically and managing data properly so that they can get the right conclusions.
2. Attitude in conducting research	Students realize the need for data to be managed and kept confidential properly as part of the responsibility of the researcher so that research data is not misused. Also, the importance of a thorough attitude in carrying out research, as well as honesty in processing data. In writing research reports, students are also reminded to have an attitude of integrity by writing complete citation sources. In addition, students also learn to use valid data to be delivered systematically.
3. The role of statistics	Through mini research, students are increasingly aware of the importance of statistics and see more clearly the significance of statistics, not only in education, but also in everyday problems. Through different topics, students learn a lot about new things around them, which they were not aware of before. Examples are changes in learning methods, daily activities (eating, drinking, sleeping), and others that have changed during the pandemic, which can be seen and tested using

	statistics. Through different topics, students can see and learn different methods and ways of doing this mini research.
4. Concept understanding	Students gain a more complete understanding of statistical material by conducting direct mini-research, namely in calculating descriptive statistics, determining hypotheses, selecting and conducting appropriate statistical tests, to how to make decisions and draw conclusions.
5. Provision for the future	Students can see the importance of studying Educational Research Statistics to prepare them for the future as prospective Christian teachers. Students get a clearer picture in practicing the theory that has been described, especially soon for working on the final project.
6. Role in the group	Through the provision of mini-research tasks carried out in groups, students learn to be able to work together better, be responsible for the tasks they are part of, and manage time more effectively in discussions. Students can see the importance of complementing each other in working on group assignments.
7. Appreciate other groups	Through the variety of topics and presentations presented, students learn to appreciate each other between groups. Students also learn about the use of attractive and effective power points in delivering messages, as well as clear and attractive presentation methods.

In Table 2 above, through a mini research project, students can gain a lot of learning insights. Another positive thing is that students can find their problems around them and try to provide solutions to these problems. This statistics course is only 2 credits, so the material presented is only up to parametric statistics. Although the material is limited, students can try to learn independently from non-parametric statistics material. Initially, students thought that when the data was not normal or homogeneous, students assumed that their research had failed. Meanwhile, in statistics, there are several methods or statistical tests for abnormal data conditions. Through a mini research project, students can practice using the normality test using Lilliefors, then using the t-test, and Z-test for one sample and 2 samples with dependent and independent samples. Several groups also use the Wilcoxon Signed Rank test because the data is not normal. The material delivered for students does not include the Wilcoxon Test. From this, students are challenged to learn independently to find out solutions in their research. The topics discussed by students were the differences sleep duration, students' time spent during pandemic, students' quota usage, time differences in using social media such as WhatsApp/Instagram/TikTok, online shopping intensity, and height/weight differences. Between male and female students, the intensity of defecation, the intensity of the amount of water consumed every day, the intensity of exercise time before the pandemic and during the pandemic, and other topics.

Through the concepts taught in statistics courses, students can see patterns and regularities in systematic research. Students also become accustomed to using existing formulas because they understand the material. Research (Prabowo, 2012) states that PjBL can improve students' understanding of statistical problems, which is indicated by the achievement of performance indicators, namely that students can understand: 1) data; 2) data collection methods and their validity; 3) data analysis; and 4) accuracy. Through mini-research projects, students are trained to be able to use and connect any material that has

been studied so that it can be applied to solving the problems found. Through mini research projects, students can see that "all truth is God's truth" (Basinger, 2021), which reflects that every truth comes from God. The meaning of "All truth is God's truth" is that everything, including research results in Educational Research Statistics, is the absolute work of God. Students can do research because it is a gift from God, and in conducting research, students need to see that knowledge is from God Himself. So, this understanding directs students in the sense that everything that exists on this earth comes from the absolute truth, namely the truth of the Bible. The Bible truth referred to here is the Bible as it is taught in Christian churches. Through statistical studies of educational research, students can see that in conducting research, it is necessary to involve God's wisdom based on the Bible. God is the source and origin of knowledge of the truth in all areas of life. This means that humans must take responsibility for using truth as a tool in environmental management. Statistics is a tool that can be used to help humans find solutions to the problems that exist around them. Through mini-research projects, students are trained to be able to see problems and find appropriate solutions to solve them. Students also learn how to manage the data with full responsibility, honesty, and integrity. Statistics are a tool that can assist humans in managing the earth. However, in the wrong hands, statistics can also be a destructive tool. Therefore, God's wisdom is needed so that humans can use statistics wisely as a blessing to others and bring glory to God's name. And finally, with the assignment of mini research projects, of course, student learning outcomes get good results with an average of 86.96. As a result, statistics teachers can use mini-research assignments to help students learn more effectively.

CONCLUSION

Project Based Learning (PjBL) in the form of assignments through mini research projects can help achieve student learning outcomes in the Educational Research Statistics course. Students can learn independently in making scientific works and processing statistical data. In addition, students also realize that the research process is a God's gift that can be used wisely for the development of human life.

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